# 1.6 Graphs of Functions

## Question Paper

| Course | Edexcel IAL Maths: Pure 1 |
|---|---|
| Section | 1. Algebra & Functions |
| Topic | 1.6 Graphs of Functions |
| Difficulty | V. Hard |

**Time allowed:**       60

**Score:**       /54

**Percentage:**       /100

**Question 1**

$(x - 2)$ and $(x + 3)$ are factors of f$(x)$, where f$(x) = x^4 - 9x^3 + 9x^2 + 85x - 150$. Sketch the graph of $y = $ f$(x)$ labelling any points where the graph intersects the coordinate axes. (There is no need to label any stationary points).

**[5 marks]**

**Question 2**

(a) On the same diagram, sketch the graphs of $y = \frac{1}{x^2}$ and $y = \frac{-3}{x^2}$.
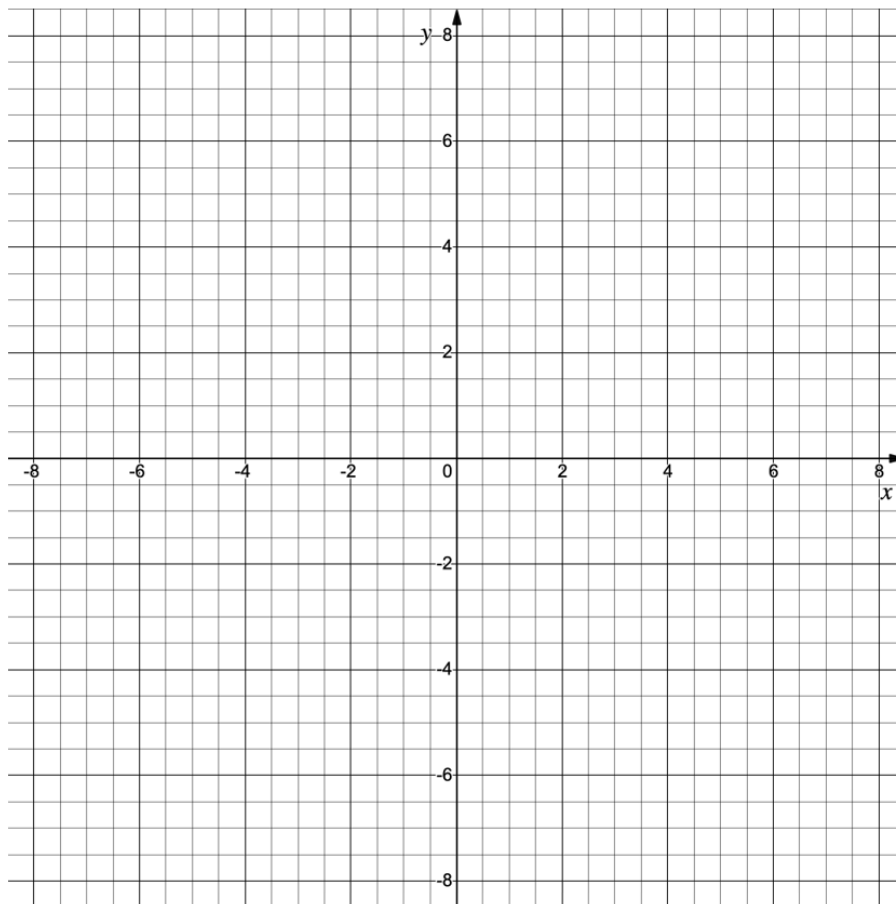
**[3 marks]**

**Question 2**

(b) Write down the equation(s) of any lines of symmetry and asymptotes for the two graphs in part (a).

**[2 marks]**

## Question 3

(a) On the axes below sketch the graphs of both $y = (x - 1)^2$ and $y = 2 - x^2 - x$.



**[3 marks]**

**Question 3**

(b) Using your graph, or otherwise, find the solutions to the equation

$$x^2 - 2x + 1 = 2 - x^2 - x.$$

**[2 marks]**

**Question 4**

$y$ is inversely proportional to the square of $x$. When $x = 4$, $y = 8$. Find the constant of proportionality and sketch the graph of $y$ against $x$.

**[4 marks]**

**Question 5**

Sketch the graph of $y = 3x^3 + 2x^2 - 3x + 10$ labelling any points where the graph intersects the coordinate axes.

**[4 marks]**

**Question 6**

(a) On the same diagram, sketch the graphs of $y = x^3 - 3x^2 - 6x + 8$ and $y = \frac{3}{x^2}$.

**[4 marks]**

**Question 6**

(b) Write down the number of solutions to the equation
$$x^5 - 3x^4 - 6x^3 + 8x^2 = 3$$

**[1 mark]**

**Question 7**

A machine computes a calculation in time, $t$ seconds, that is proportional to the cube root of the number of processes, $p$, involved. For a calculation involving 8 processes the computer takes $6.4 \times 10^{-4}$ seconds.

(a) How many processes are involved for a calculation taking $1.28 \times 10^{-3}$ seconds?

**[4 marks]**

## Question 7

(b) Find the time it takes for the machine to compute a calculation involving 250 processes.

**[2 marks]**

## Question 8

(a) On separate diagrams, sketch the graphs of $y = \frac{a}{x^2}$, where $a > 0$ and $y = \frac{a}{x^2}$, where $a < 0$.

**[3 marks]**

**Question 8**

(b) One of the graphs passes through the point with coordinates $(m, m^6)$.

Write $a$ in terms of $m$ and, justifying your answer, state which graph this point must lie on.

**[3 marks]**

**Question 9**

(a) Fully factorise $4x^3 + 17x^2 + 20x + 4$.

**[3 marks]**

**Question 9**

(b) Sketch the graph of $y = 4x^3 + 17x^2 + 20x + 4$.

Label any points where the graph crosses the coordinate axes.

**[2 marks]**

**Question 10**

On the same diagram, sketch the graphs of $4y = x^3 - 5x^2 - 12x + 36$ and $x + y - 6 = 0$.

Label the coordinates of any points of intersection between the two graphs.

Also label any points where the graphs intersect the coordinate axes.

**[9 marks]**